

EPA (Environmental Protection Agency)
Pesticide Fact Sheet No. 187: Methoxychlor

(U.S.) Environmental Protection Agency
Washington, DC

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U.S. Department of Commerce
National Technical Information Service

NTIS

United States
Environmental Protection
Agency

Office of Pesticides and Toxic Substances
Office of Pesticide Programs (TS-766C)
Washington, DC 20460

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Pesticide Fact Sheet

Name of Chemical: METHOXYCHLOR

Reason for Issuance: REGISTRATION STANDARD

Date Issued: December 1988

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1. DESCRIPTION OF CHEMICAL

Generic name: 1,1,1-trichloro-2,2-bis(4-methoxyphenyl) ethane

Common name: Methoxychlor

Trade Names: Marlate, Prentox, and Methoxcide

Other Chemical Nomenclature: 1,1,1-trichloro-2,2-di(4-methoxyphenyl)ethane; 1,1-(2,2,2-tri chloroethylidene)-bis[4-methoxybenzene]; 1,1,1-trichloro-2,2-bis(p-methoxyphenyl)ethane; 2,2-bis(p-methoxyphenyl)-1,1,1-trichloroethane

CAS Registry No.: 72-43-5

EPA Pesticide Chemical Code (Shaughnessy Number): 034001

Empirical Formula: $C_{16}H_{15}Cl_3O_2$

Molecular Weight: 345.7

Year of initial registration: 1948

Pesticide type: Insecticide/Acaricide

Chemical family: Chlorinated Hydrocarbon

U.S. Registrants: Chemical Formulators; Prentiss Drug & Chemical Co., J.R. Simplot Co.; Dynachem Industries; Clover Chemical Co.; Drexel Chemical Co.; Kincaid Enterprises; and Wesley Industries

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Enterprises; and Wesley Industries

2. USE PATTERNS AND FORMULATIONS

Registered

Uses:

TERRESTRIAL FOOD CROP use: (1) seed treatment only use on grains and various vegetables; (2) foliar application (including seed treatment) use on vegetables and fruits; and (3) foliar application only use on vegetables and fruits

TERRESTRIAL NON-FOOD CROP use on grasses, ornamentals and trees

GREENHOUSE FOOD CROP use on mushrooms

DOMESTIC AND NON-DOMESTIC OUTDOOR use around dwellings and for garbage and sewer areas, general urban outdoor use

AQUATIC FOOD use on cranberry

AQUATIC NON-FOOD use for mosquito larvae control in aquatic sites, such as beaches, lakes, marshes and rivers

FORESTRY use on forest trees

INDOOR use on: (1) postharvest stored grain commodity and premise treatment; (2) direct animal treatment for dogs, cats, and farm animals; (3) agricultural premise use; (4) kennels, dog sleeping quarters and cat sleeping quarters; (5) indoor domestic dwellings for use on household contents such as human clothing (including woolens); (6) direct application to humans; (7) commercial and industrial use in food processing, storage transportation areas and equipment

Pests Controlled: various nuisance species (some of public health significance) including cockroaches, mosquitoes, flies and chiggers; various arthropods attacking field crops, vegetables, fruits, ornamentals, stored grain, livestock and domestic pets

Methods of Application: sprays, fogs, paints, ground and aerial equipment, animal dust-bags, dips, sprays and back-rubbers

Formulations: Wettable powders, dusts, emulsifiable

concentrates, flowable concentrates,
liquid soluble concentrates, granules,
ready-to-use products (liquids) and
pressurized liquids

3. SCIENCE FINDINGS

Summary Science Statement

With the exception of one mutagenicity study, there are no acceptable acute, subchronic, or long-term toxicology/oncogenicity studies available to support technical methoxychlor. In the acceptable mutagenicity study, an unscheduled DNA synthesis assay in mammalian cells in culture, no abnormal DNA synthesis was noted at any of the dose levels tested.

Based on acceptable laboratory data, technical methoxychlor is characterized as very highly toxic to fish and aquatic invertebrates, and practically nontoxic to birds and bees. Based on theoretical calculations, both terrestrial and aquatic uses of methoxychlor may pose a hazard to aquatic organisms, although there is no field evidence to support this. The impacts of methoxychlor use to nontarget organisms will be assessed upon receipt of ecological effects and environmental fate data.

The environmental fate of methoxychlor cannot be characterized because acceptable data are lacking. Preliminary data suggest that methoxychlor is unlikely to contaminate groundwater because of its low solubility and high rate of adsorption to soil particles.

The nature of the residues of methoxychlor in plants and animals is not adequately understood. None of the tolerances for methoxychlor is adequately supported. Plant and animal metabolism studies, residue studies, analytical methodology, processing studies, and storage stability data are needed before the Agency can determine the adequacy of current tolerance levels.

Chemical/Physical Characteristics of the Technical Material

Chemical/Physical Characteristics:

Color: Data Gap
Physical State: Crystalline solid (Farm
Chemicals, 1987)
Odor: Data Gap
Melting Point: 89 °C (Farm Chemicals,
1987)
Specific Gravity: Data Gap
Solubility: Very soluble in aromatic
chlorinated, or ketonic solvents,

somewhat soluble in paraffinic
types; essentially insoluble
in water (Farm Chemicals, 1987)

Vapor Pressure: Data Gap

Flammability: Data Gap

pH: Data Gap

Toxicology Characteristics

With the exception of one mutagenicity study, there are no acceptable acute, subchronic or long-term toxicology/oncogenicity studies available to support technical methoxychlor. In the mutagenicity study, a mammalian cell in culture unscheduled DNA synthesis assay (UDS assay), no increase in abnormal DNA synthesis was noted.

Environmental Characteristics

The Agency is unable to assess the environmental fate of methoxychlor because acceptable data are lacking. Preliminary data indicate that methoxychlor is stable to hydrolysis (half-life > 200 days); photodegradation in water (half-life of 4.5 months); and aerobic soil metabolism (half-life > 3 months in sandy loam soil). The half-life for anaerobic soil metabolism is reported at less than 1 month in sandy loam soil. Preliminary data also indicate that methoxychlor has a high adsorption rate to soil sediment (K_d value is 620).

Ecological Characteristics

Based on acceptable laboratory data, technical methoxychlor is characterized as practically nontoxic to birds on both an acute oral and subacute dietary basis and very highly toxic to fish and aquatic invertebrates on an acute basis. There is sufficient information to characterize methoxychlor as relatively nontoxic to honey bees. The acute toxicity value = 24 ug/bee.

- Acute LD50 (bobwhite):
 >2510 mg/kg
- Dietary LC50
 >5620 ppm (upland gamebird)
- Freshwater invertebrates toxicity (96-hr LC50) for
 daphnid .78 ppb
- Fish acute toxicity (96-hr LC50) for rainbow trout:
 1.31 ppm
- Fish acute toxicity (96-hr LC50) for brook trout:
 0.009 ppm

Tolerance Assessment

Tolerances have been established for residues of

methoxychlor in a variety of raw agricultural commodities, in meat, fat and meat byproducts (40 CFR 180.120). Tolerances are expressed in terms of methoxychlor per se.

The nature of the residues of methoxychlor in plants and animals is not adequately understood. None of the tolerances for methoxychlor is adequately supported. Plant and animal metabolism studies, residue studies, analytical methodology, processing studies, and storage stability data are needed before the Agency can determine the adequacy of current tolerance levels.

The Preliminary Limiting Dose (PLD) of methoxychlor is .005 mg/kg/day. This is based on a rabbit teratology study with a No Observed Effect Level (NOEL) of 5 mg/kg/day for increased loss of litters and an uncertainty factor of 1000 to account for inter- and intraspecies differences, poor quality of the study used and total incompleteness of the subchronic and chronic toxicity data base. The study is not considered to be adequate to define a NOEL for purposes of setting an Acceptable Daily Intake, since the experimental design was considered to be inadequate. It is being used on an interim basis for calculation of the PLD. The Agency is unable to complete a tolerance assessment of methoxychlor because of the incompleteness of the toxicology and residue chemistry data bases.

4. SUMMARY OF REGULATORY POSITIONS AND RATIONALES

- Methoxychlor is not being placed into Special Review at this time. Since there are so few acceptable studies available to support registration of products containing methoxychlor, the Agency is not yet able to make a determination as to whether any of the criteria of 40 CFR 154.7 have been met or exceeded.
- The Agency will not approve any new food uses, including minor uses for this chemical since none of the tolerances are adequately supported.
- The Agency is unable to assess methoxychlor's potential for contaminating groundwater. When data required in the Standard have been received and evaluated, the Agency will assess the potential for methoxychlor to contaminate groundwater.
- Updated worker safety rules are required for end-use product labels.
- The Agency is not establishing a longer reentry interval for agricultural uses of methoxychlor beyond the minimum reentry interval (sprays have dried, dusts have settled, and vapors have dispersed).
- Revised and updated fish and wildlife statements are

required for end-use product labels. Since methoxychlor is practically nontoxic to bees, the bee statement imposed under under PR Notice 68-19 is no longer appropriate. Registrants must remove the bee statement from the labeling.

- The Agency is not classifying methoxychlor as a restricted use pesticide at this time, since it is unable to determine if this pesticide meets any of the risk criteria of 40 CFR 152.170. Upon receipt of data required under this Standard, the Agency will apply the criteria of 40 CFR 152.170 to determine if any uses of methoxychlor warrant restricted use classification.

- Since methoxychlor is an analogue of DDT, the Agency is requiring specific analysis of methoxychlor for the potential impurities 1,1,1-trichloro-2,2-bis(p-chlorophenyl)ethane (DDT) and other structurally similar compounds.

SUMMARY OF OUTSTANDING DATA REQUIREMENTS

Toxicology

Time Frame

Acute Oral Toxicity	9 Months
Acute Dermal Toxicity	9 Months
Acute Inhalation Toxicity	9 "
Eye Irritation	9 "
Dermal Irritation	9 "
Dermal Sensitization	9 "
21-Day Dermal Toxicity	50 "
Chronic Testing (rodent)	50 "
Chronic Testing (non-rodent)	50 "
Oncogenicity (rat)	50 "
Oncogenicity (mouse)	15 "
Teratogenicity (rat)	15 "
Teratogenicity (rabbit)	39 "
Reproduction	9 "
Gene Mutation	
Other Mechanisms of	
Mutagenicity	12 "
Metabolism	24 "

Environmental Fate/Exposure

Hydrolysis	9 Months
Photodegradation in Water	9 "
Photodegradation on Soil	9 "
Aerobic Soil Metabolism	27 "
Anaerobic Soil Metabolism	27 "
Anaerobic Aquatic Metabolism	27 "
Aerobic Aquatic Metabolism	27 "
Leaching and Adsorption/ Desorption	12 "

Aquatic Dissipation	27 "
Forestry	27 "
Soil, Long-term	39 "
Confined Rotational Crop	39 "
Accumulation in Irrigated Crops	39 "
Accumulation in Fish	12 "
Accumulation in Aquatic	
Nontarget Organisms	12 "

Fish and Wildlife

Avian Reproduction	24 Months
Freshwater Fish LC ₅₀ Studies (TEP)	9 "
Freshwater Invertebrate LC ₅₀ Studies (TEP)	9 "
Estuarine and Marine	
Organisms LC ₅₀ Studies (TEP)	12 "
Fish Early Life Stage	
and Invertebrate Life Cycle	15 "
Simulated or Actual Field	
Testing-Aquatic Organisms	24 "
Seed Germination/Seedling	
Emergence	9 "
Aquatic Plant Growth	9 "

Residue Chemistry

Residue data - Raw Agricultural Commodities	18 Months
Processing Studies	24 "
Plant and Animal Metabolism	18 "
Storage Stability	15 "
Residue Analytical Methods	15 "

Product Chemistry

All Data	9 -15 Months
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6. Contact Person at EPA

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DISCLAIMER: The information presented in this Chemical Information Fact Sheet is a summary only and may not be used to fulfill data requirements for pesticide registration and reregistration.